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Cenozoic magmatism of north Victoria Land, Antarctica: an experimental study on the mantle source of a primary basanite from the McMurdo Volcanic Group

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Volcanoes of the McMurdo Vocanic Group (MMVG) (Antarctica) dot the eastern shoulder of Ross Sea Rift System giving rise to alkaline transitional volcanic suites which in north Victoria Land are emplaced since Early Cenozoic.
Geochemical geological, geophysical and geochronological data on Cenozoic volcanic activity in NVL suggest that the region is a site of passive astenospheric rise, rather than affected by a thermally active mantle plume. Furthermore the comparison of geochemical and isotopical data of basic lavas with those provided by mantle xenoliths they carry to the surface, document the compositional heterogeneity of sublithospheric mantle caused by the coupled action of partial melting and metasomatism. In particular the metasomatic episode is probably linked to the amagmatic extensional event that affected the West Antarctic Rift System in the Late Cretaceous. The astenospheric melts generated during this event, moving through the upper mantle, can have crystallized as veins or may have led to the formation of metasomatic minerals such as amphibole or phlogopite. In this scenario the mineralogical and chemical composition of sources responsible for Cenozoic magmatism, amphibole-bearing spinel-peridotite versus pyroxenite in the garnet stability field, it is still a matter of debate. To shed light on this argument a previous experimental study on a basanite of MMVG, representative of primary magma (Orlando et al., 2000) has been integrated with new experimental investigation on the same basanitic composition. The preliminary experiments were conducted to pressures of 1.0 - 2.0GPa in the presence of 0-1% of added water and indicate olivine on the liquidus at 1.0 GPa that is substitute by clinopyroxene at 2.0GPa. The addition of 1% of water induces a decrease of liquidus temperature of about 40°C shifting its value in the T range (1280-1310°C) the same that was inferred by melt inclusions hosted in the olivine phenocrysts of the studied basanite.